A Modular, Reconfigurable Surveillance UAV Architecture

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METEOR SURVEILLANCE UAVs Road - Map

Mirach 2000 Falco Family

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PERFORMANCE INDEX:

$$IP = \left(\prod_{i=1}^{4} F_i \right) \cdot 1.0e-03$$

- **Loading capability** ……

$$F_1 = \frac{W_{PL}^{MAX}}{W_{TOG}}$$

- **Ceiling** ……..

$$F_2 = \frac{h_C}{b}$$

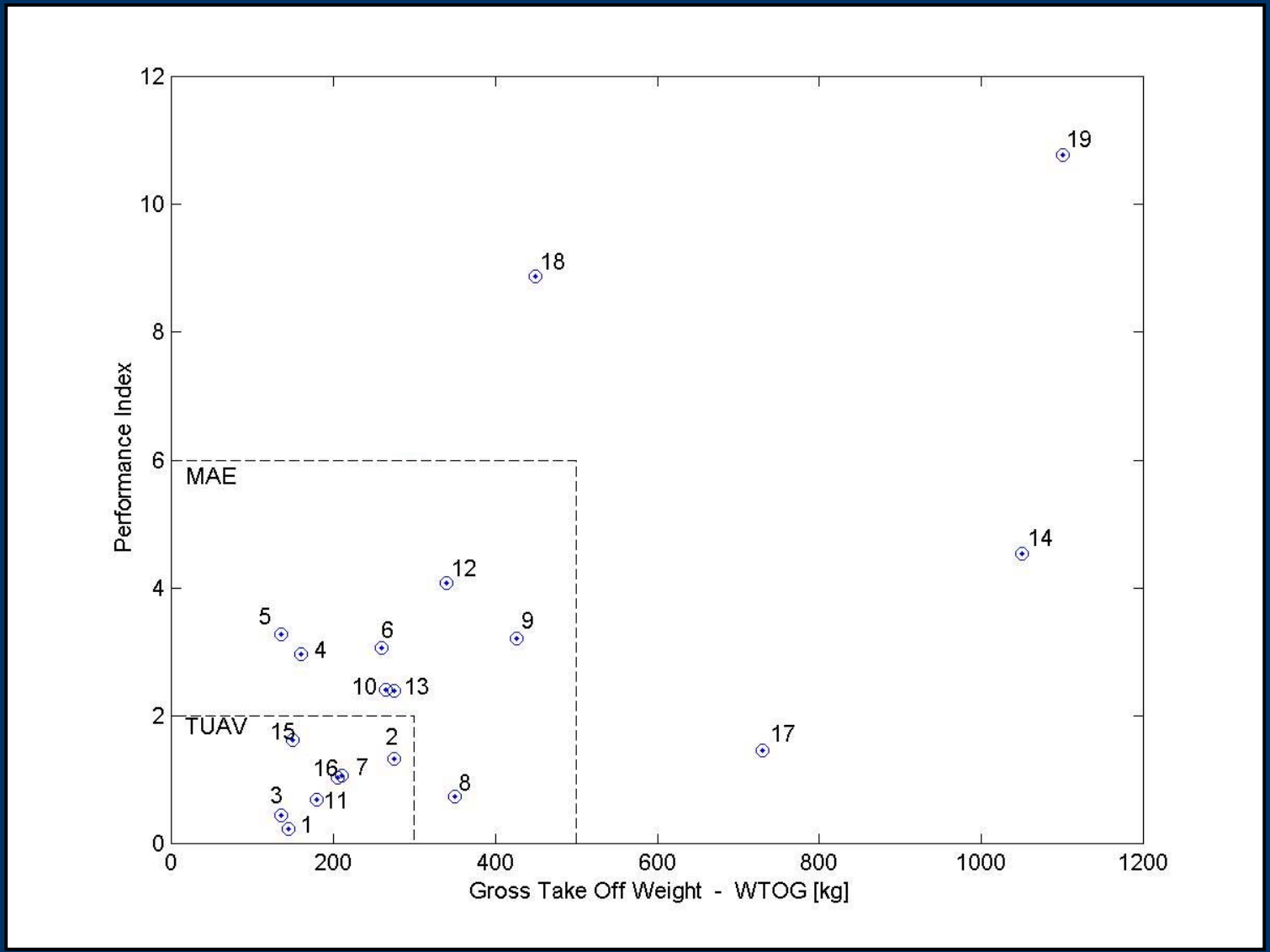
- **Permanence flexibility** ……

$$F_3 = \frac{E_{MAX}}{\left(R/V_{MAX}\right)}$$

- **Excess power margin** ……

$$F_4 = \frac{V_{OPER}}{V_{MIN}}$$

SURVEILLANCE UAV SYSTEMS : PERFORMANCE INDEX



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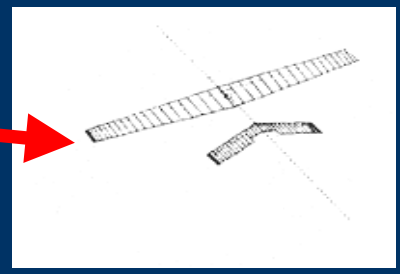
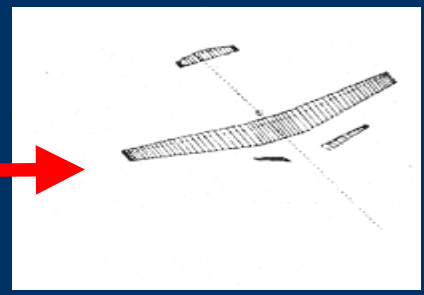
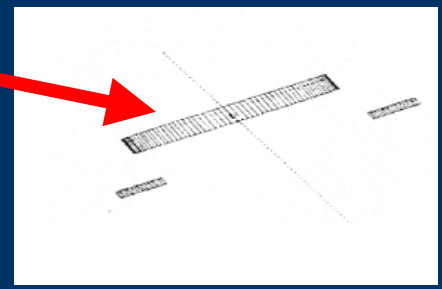
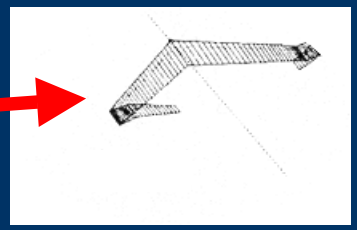
LIFTING SURFACES CONCEPT SELECTION

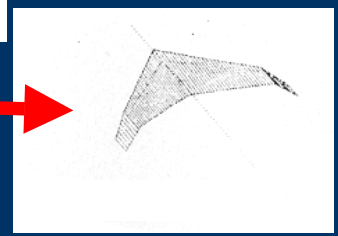
- Conventional
- Three-Surface
- Outboard Horizontal Stabiliser
- C-wing
- Flying wing
- Joined wing

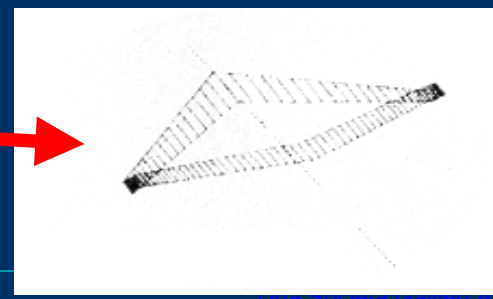












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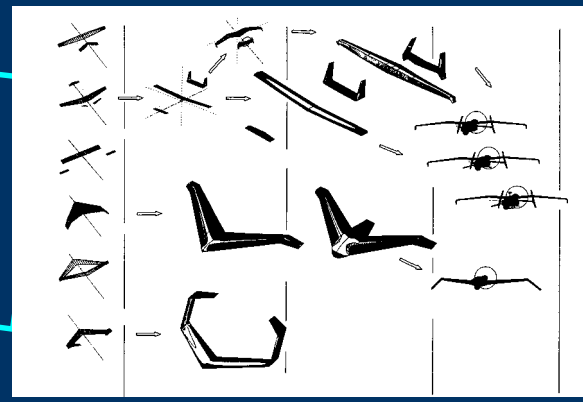
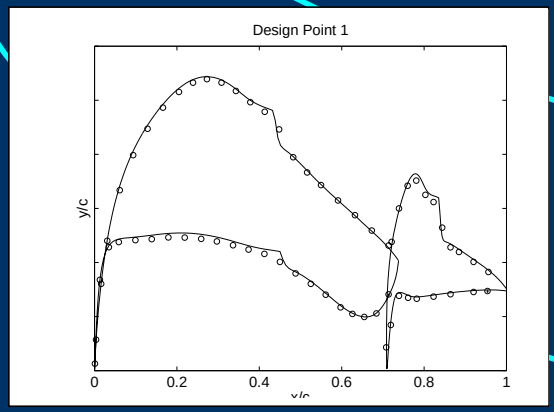
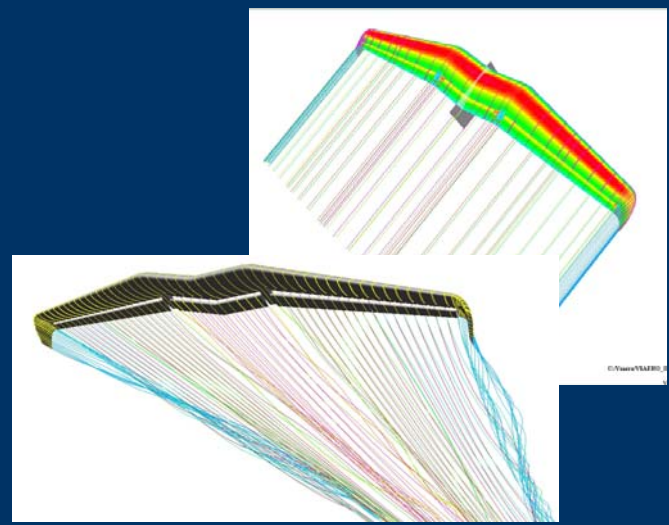


LIFTING SURFACES DESIGN PATH





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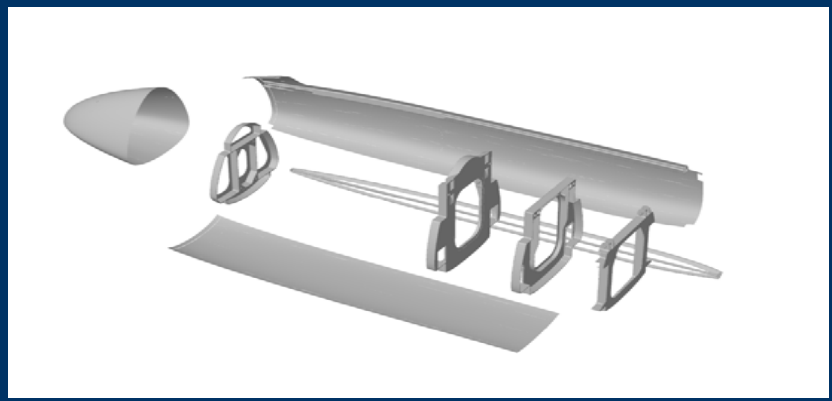
Modular Structure - Fuselage

√Length variable via modification of constant profile mid section

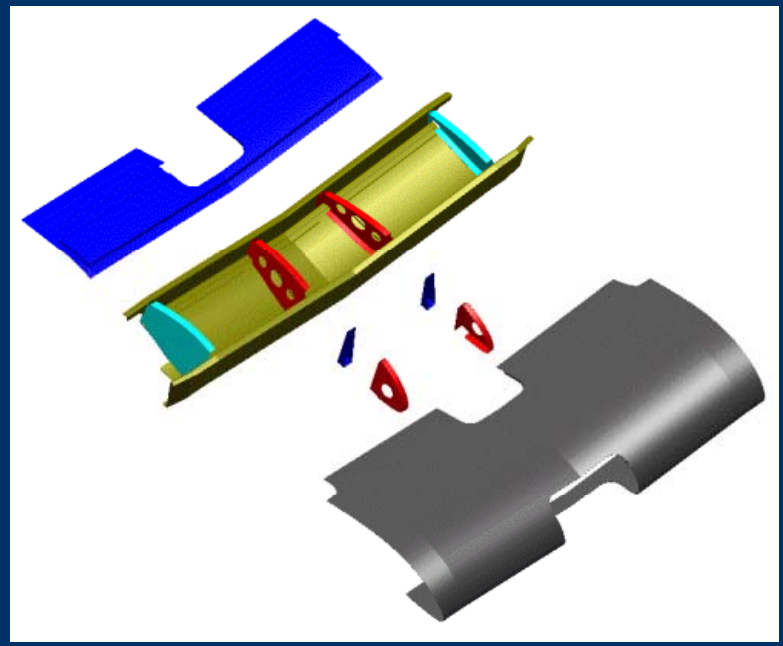
√Outer skin made of a stiff, thin, lightweight carbon fibre/foam sandwich structure

√ Numerous large access hatches on top and bottom



Modular Structure - Wing & Tail

- √ **Modular design permits resizing of wing and tail**
- √ **Tool free, rapid assembly**
- √ **Extensive use of composite materials**
- √ **Robust design resilient to impact damage**



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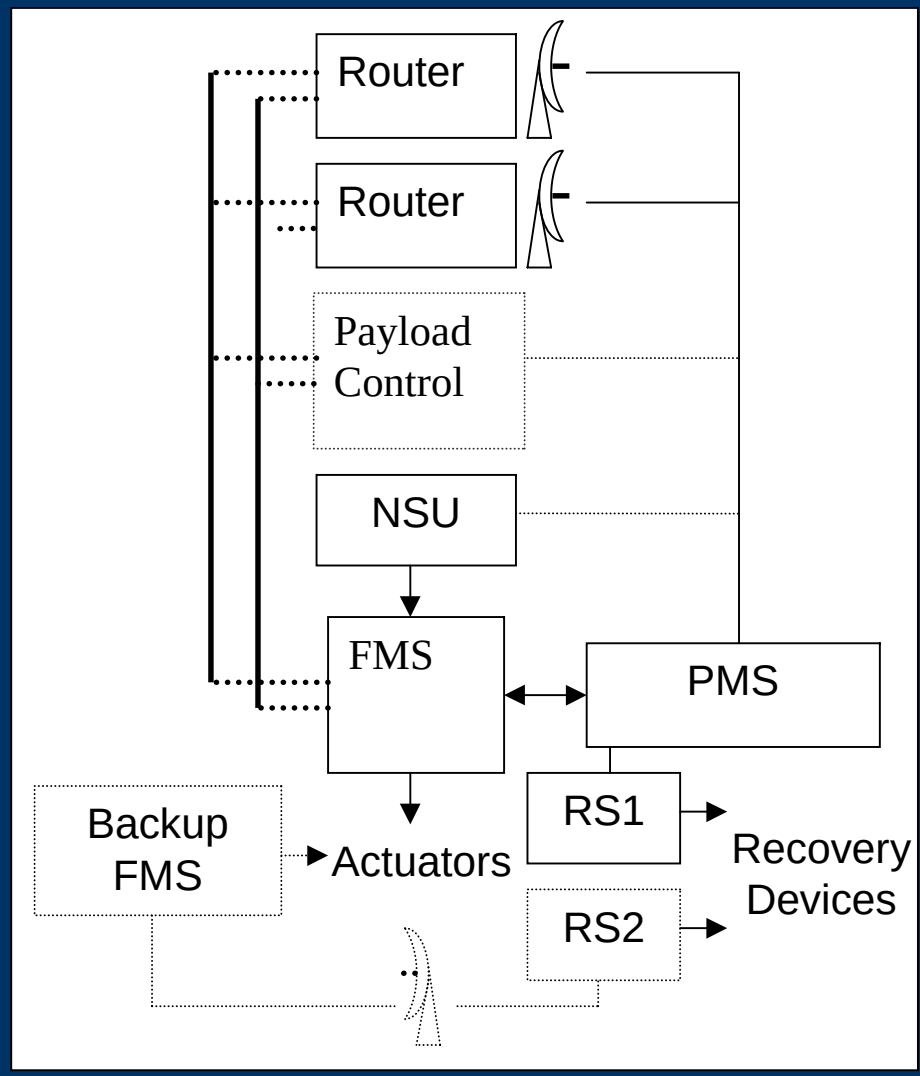
Avionics Architecture

√ Flexible multiple mini cabinet approach facilitates access and maintenance

√ Extensive use of COTS components

√ Bus architecture based on a robust, redundant Ethernet implementation



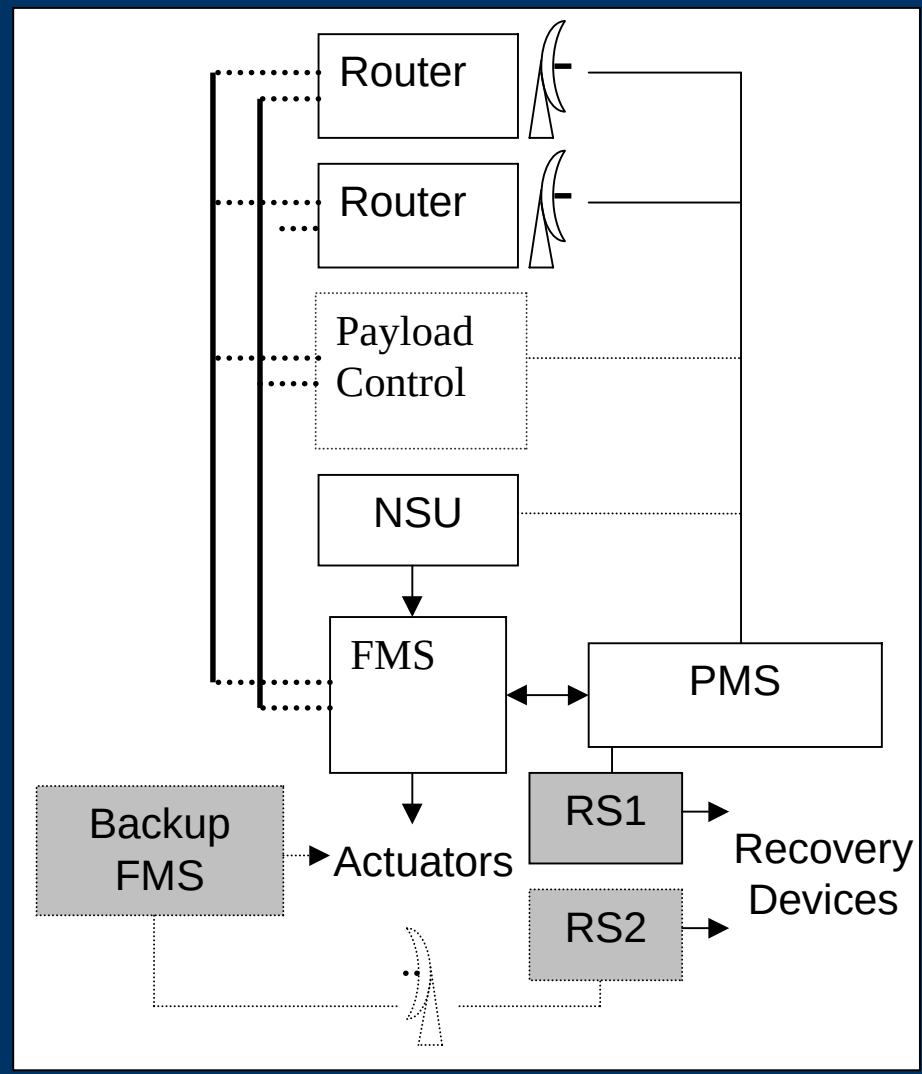
Avionics Architecture

√ Backup FMS permits safe control of vehicle to recovery zone

√ Redundant recovery system

√ Full recovery possible even in event of complete power loss

√ Modular design permits redundancies to be added or removed as required for a particular configuration.



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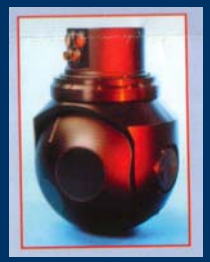
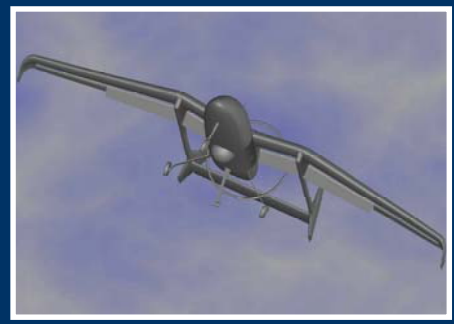


- Daylight TV Camera
- IR Sensor
- HR Spotter
- Laser Range Finder

Linescanner

ELINT



SAR/MTI

Autoprotection System

GCS

Portable Station

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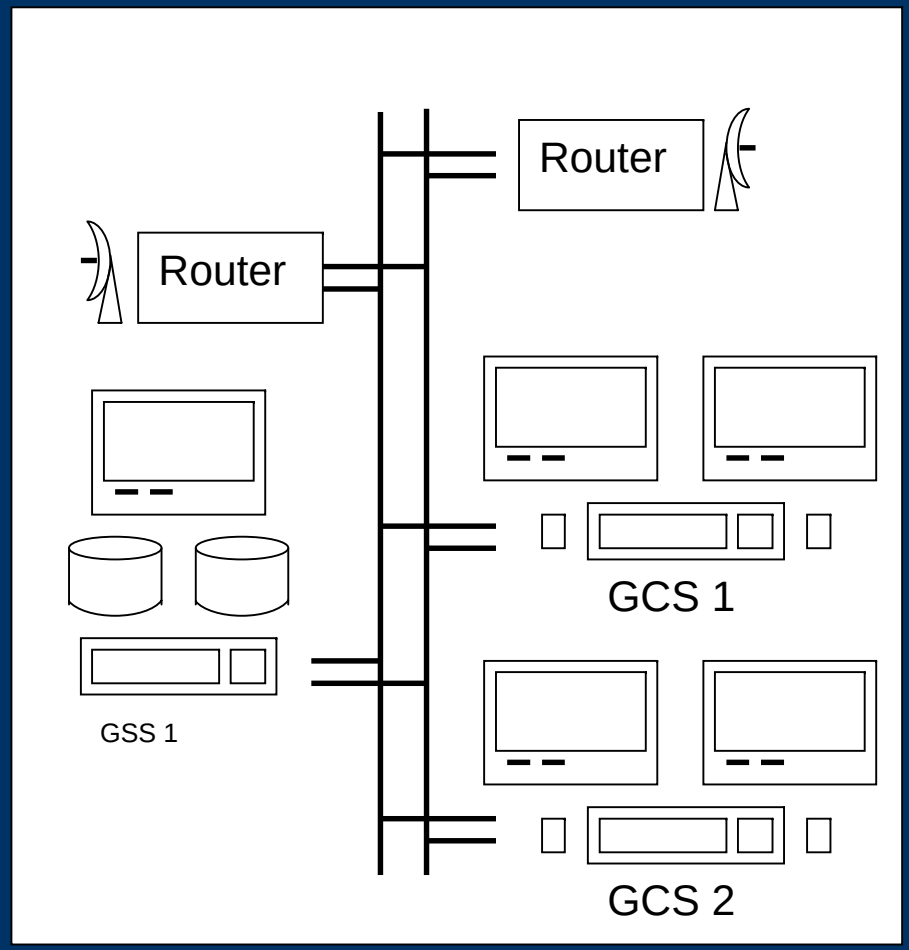
Ground Station Architecture

- √ **Architecture based on industry standard PC workstations**
- √ **Multiple terminals and storage servers are connected to each other and the radio links via a redundant network**
- √ **WAN operation possible**

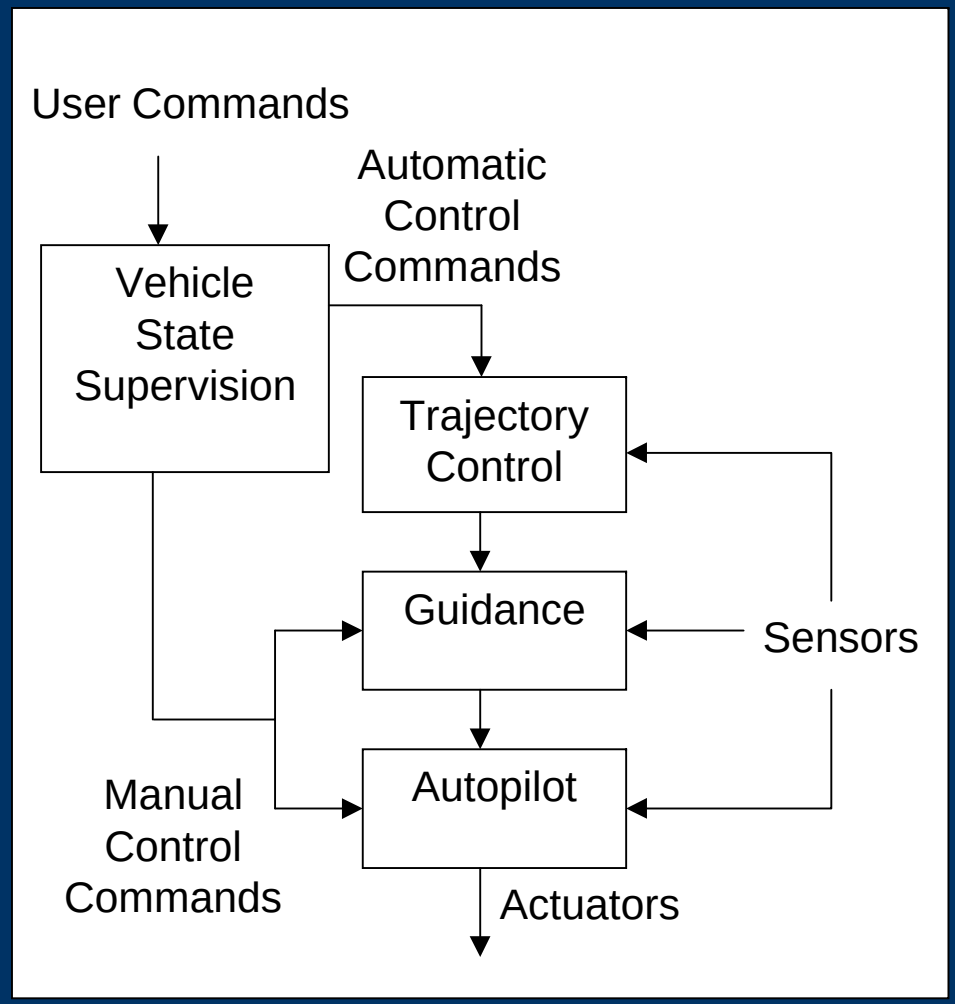


Flight Control System - Architecture

√ Hybrid robust optimal / classical design

√ Extensive use of automated optimisation systems permits rapid recalculation of gains for new configurations

√ All flight surfaces used optimally in all flight conditions



Flight Control System - Control Modes

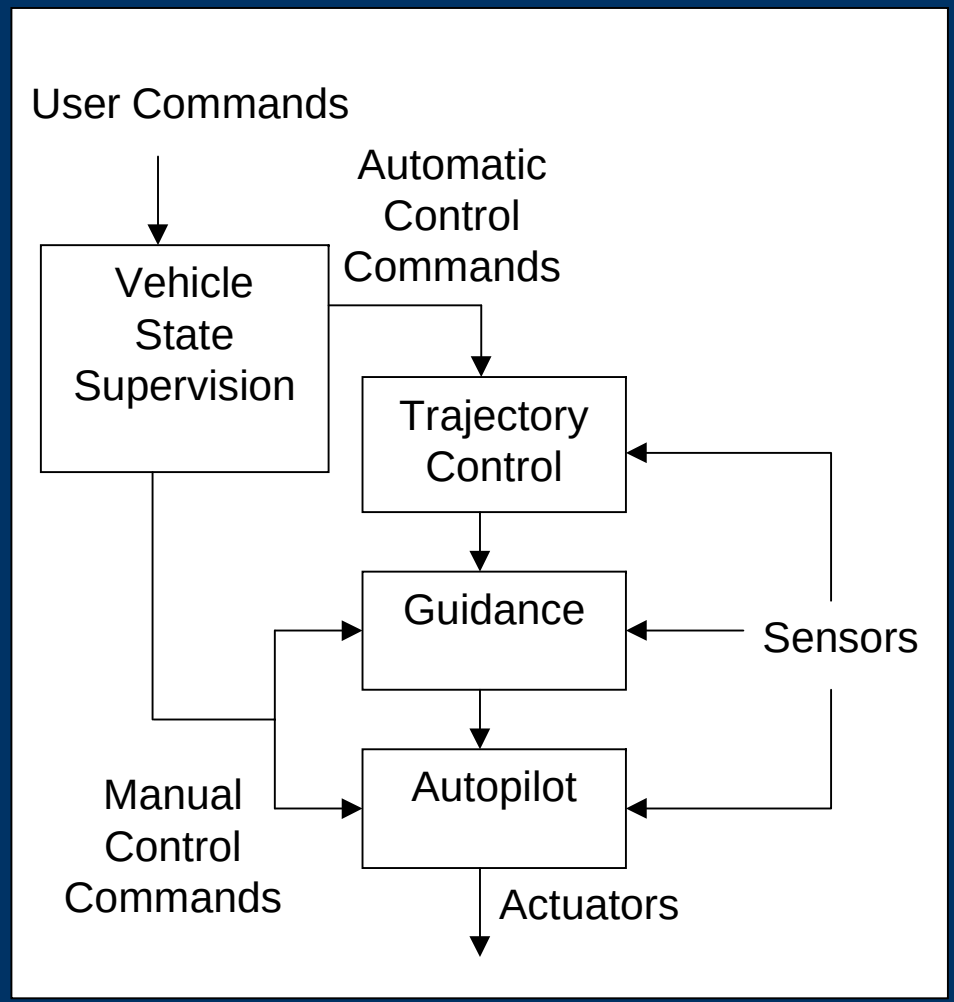
√ Wide variety of assisted manual control modes

√ Semi automatic mode allows for “Click and Go” control

√ Fully automatic mission control mode

√ Automatic mission creation based on observation plan

√Automatic STOL takeoff and landing



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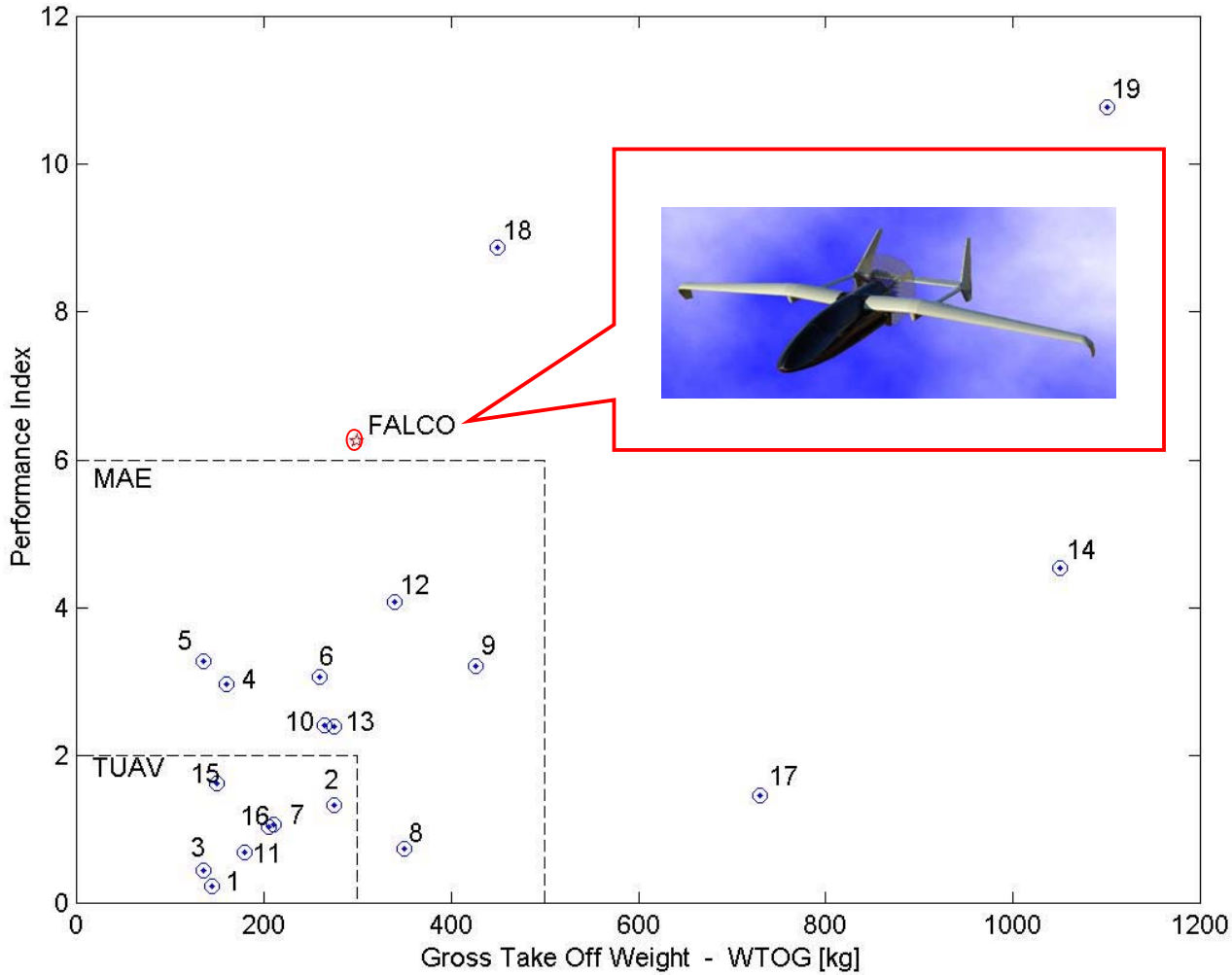
SURVEILLANCE UAV SYSTEMS : PERFORMANCE INDEX



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FALCO I TUAV SYSTEM

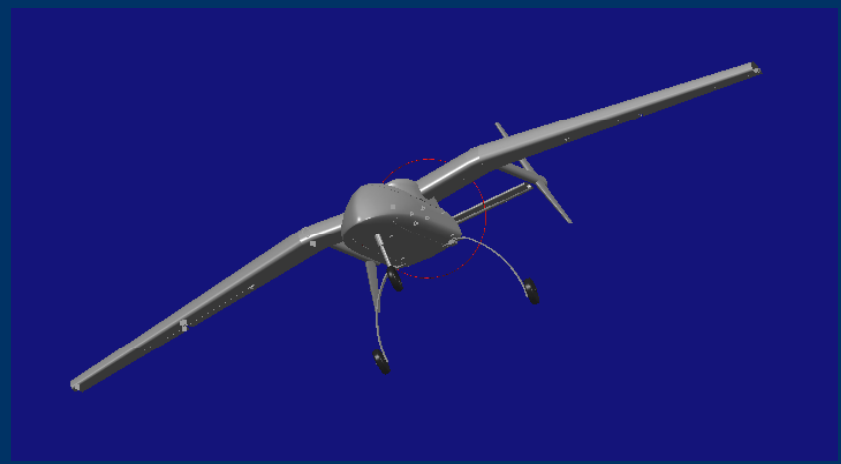
Role: - Area Surveillance, Targets Acquisition and Identification
- Target Designation

Technical Characteristics

Take-off weight: ……. > 250 Kg
Endurance: …… > 8 hrs
Link range : …… > 150 Km
Service ceiling: ……. > 6000 m
Payload: ……... > 70 Kg

Operational Capabilities

- Automatic STOL capability
- Intelligent multi-payload interface
- System designed according to:
  - STANAG 4685 (Interoperability)
  - Dual-use criteria (ATM Integration)



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Conclusions

√A modular, reconfigurable vehicle architecture has been created which permits the creation of a broad range of UAV systems

√ An example of a vehicle design based on the architecture has been presented

√This new vehicle design, called Falco will commence flight trials in 2003

Questions ?

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